Visual Analytics (INM433)

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MSc Data Science

Wednesday 8th April

Data

Overview, description and properties of the dataset

Chosen Dataset

- Competition Data from the Crossfit Open (2011)
- Worldwide competition
- 5 Week long competition, each week represents one demanding workout (WOD)

Contents of the dataset

- Basic Athlete metrics: Weight, Age, Gender and Height
- Results and Rankings

Dataset Source

- Acquired by Web Crawling
- Expectation: Messy and unprocessed

What is Crossfit?

- CrossFit is a rigorous fitness methodology that that attempts to unite multiple domains of fitness into one programme
- Domains include; Weightlifting, High Intensity Interval Training (HIIT) and Gymnastics

Data [10%]. Description of the data chosen for the analysis: type, structure, size, properties of the components.

Data

- Overview, description and properties of the dataset

Type of Data: Multi-dimensional dataset
Class of Data: Object Referenced Data

Data Quality:

Incompleteness

- For all the attributes there exists a degree of incompleteness
- Consideration will be determined on a feature by feature basis

Uncertainty

- The credibility and integrity of the data could be of some concern,

Number of Instances	25973		
Number of Referrers	2	**Athletes Name**	
		Competition Region	
Number of Attributes	19	**Nominal**	2
		Ordinal	3
		Interval	-
		Ratio	14
Types of Values	**Numeric**		18
	Textual		3
	Spatial		0
	Addresses		0
	Temporal		1

Notes: The dataset overview above is the dataset has not been cleaned prior to review. 'athlete id' and 'nameURL' have been considered as one value. The region feature can be considered as both textual and temporal.

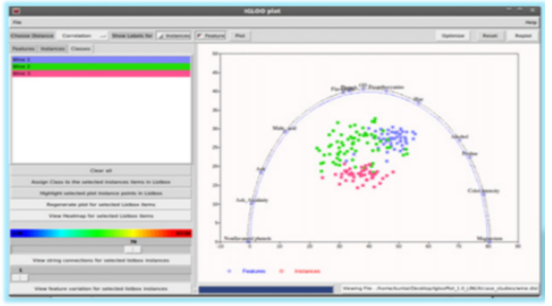
Data [10%]. Description of the data chosen for the analysis: type, structure, size, properties of the components.

Analysis Tasks

- Literature review, work to be undertaken and synoptic task

Literature Review: Dimensionality Reduction (DR)

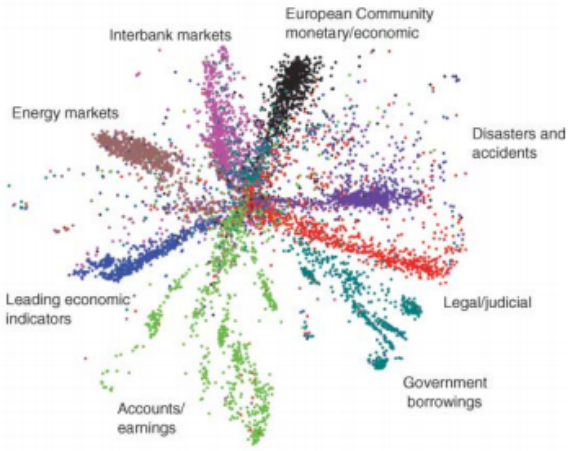
Exploitation: The focus of the review was deliberately limited to DR as the number of considerations and techniques available in the area of multidimensional analysis are vast.



Limitation: DR was specifically identified as very useful in assisting with the visualisation of multidimensional datasets.

Challenges:

- Trying to understand the data model would find it difficult to interpret and make meaningful interpretations of the data
- Minimising Information loss



Work Accessed and Discussed:

- Visual Hierarchical Dimensionality Reduction (VHDR) – Methodology for avoiding gaining maximum information
- Neural Networks (Autoencoders) – An alternative approach to DR, can "learn" non-linearities
- Igloo Plots – A visual approach to visualising many dimensions simultaneously

Analysis tasks [10%]. Analysis task(s) chosen for your analysis: Do these relate to the tasks you addressed in your literature review (part 1)? If so, how? Specific task formulations for the chosen data and the corresponding generic task types.

Analysis Tasks

- Literature review, work to be undertaken and synoptic task

Research Question/Statements:

"Are there significant variations in athlete scores that enable the ability to identify cohorts of similar performance"

Intermediate Questions

- Who are the top individuals globally and by region? Are they comparative and exhibit the same types of characteristics?
- How does the drop of participation of each of the Open events distort the comparison of athletes?
- What key features do the top athletes have that the less competitive do not?
- How do gender, height and weight relate to the performance of athletes in the Crossfit Open competition?

It is expected that during the analysis that further questions (elementary and intermediate) will arise as a result of these pre-determined questions.

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Analysis Methodology

Overview, description and techniques used in the process

5 Phases of the Analysis

1. **Understanding of the characteristics of the attributes**
   - *understanding of each of the distributions and basics statistics about every feature*

2. **Understanding of the Relationships between the attributes**
   - *Investigate the relationships between features perception*
   - *Using a variety of different visual display types*
   - *Careful consideration of the types of visual encodings: shape, size, colour and labelling, to aid and complement with the understanding*

3. **Describing the relationships**
   - *Two computational methods will be utilised at this stage; Gaussian Mixture Models (GMM) and Self Organising Maps (SOM)*
   - *Answer the intermediate and research questions*

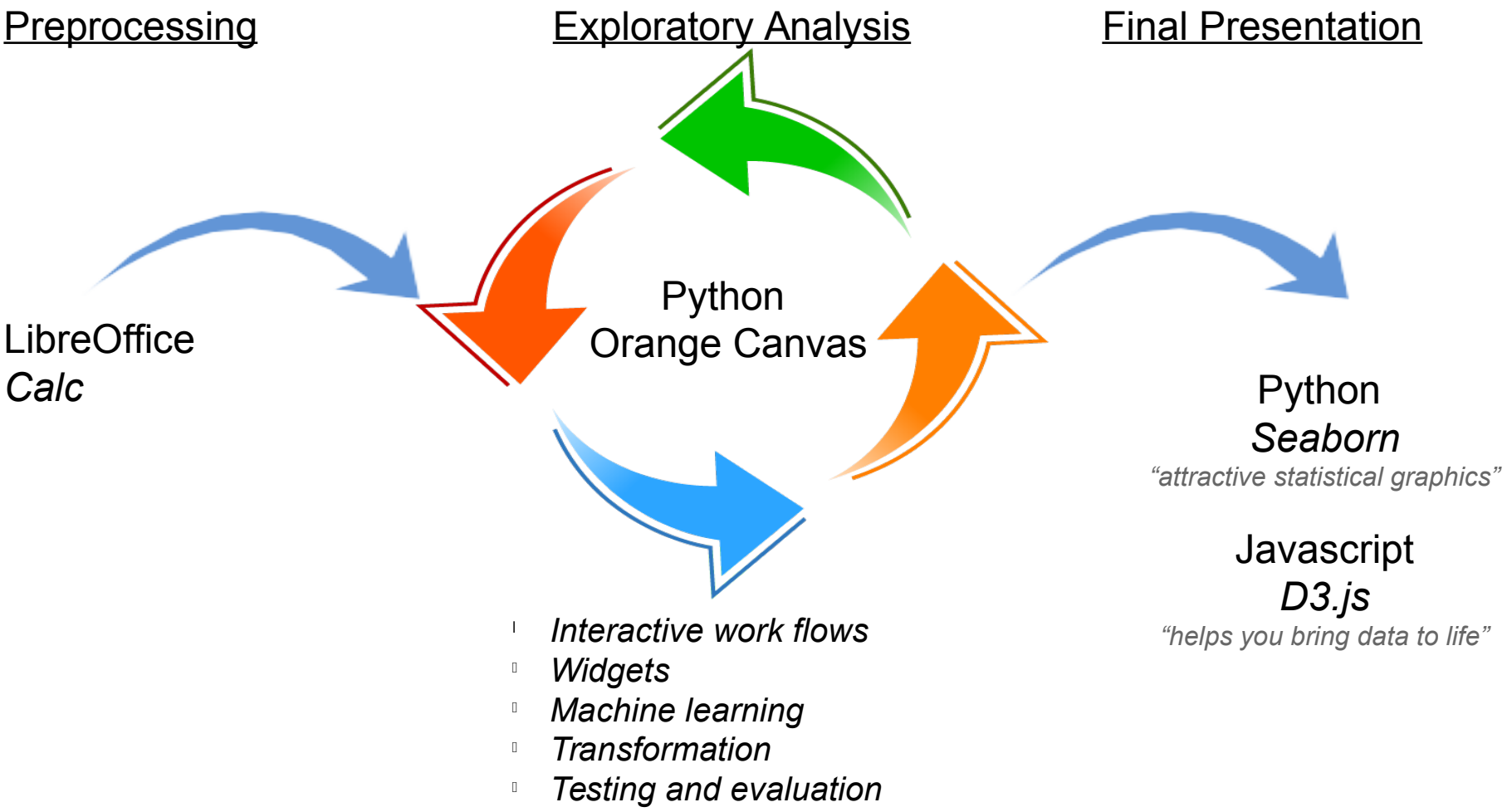
4. **Exploring the findings iteratively through interaction**
   - *It is expected that navigating many times between phase 1-3*

5. **Final presentation**
   - *Final Improvement and refinement of the visualisations*

Analysis methodology [30%]. Methodology of your analysis.

Implementation

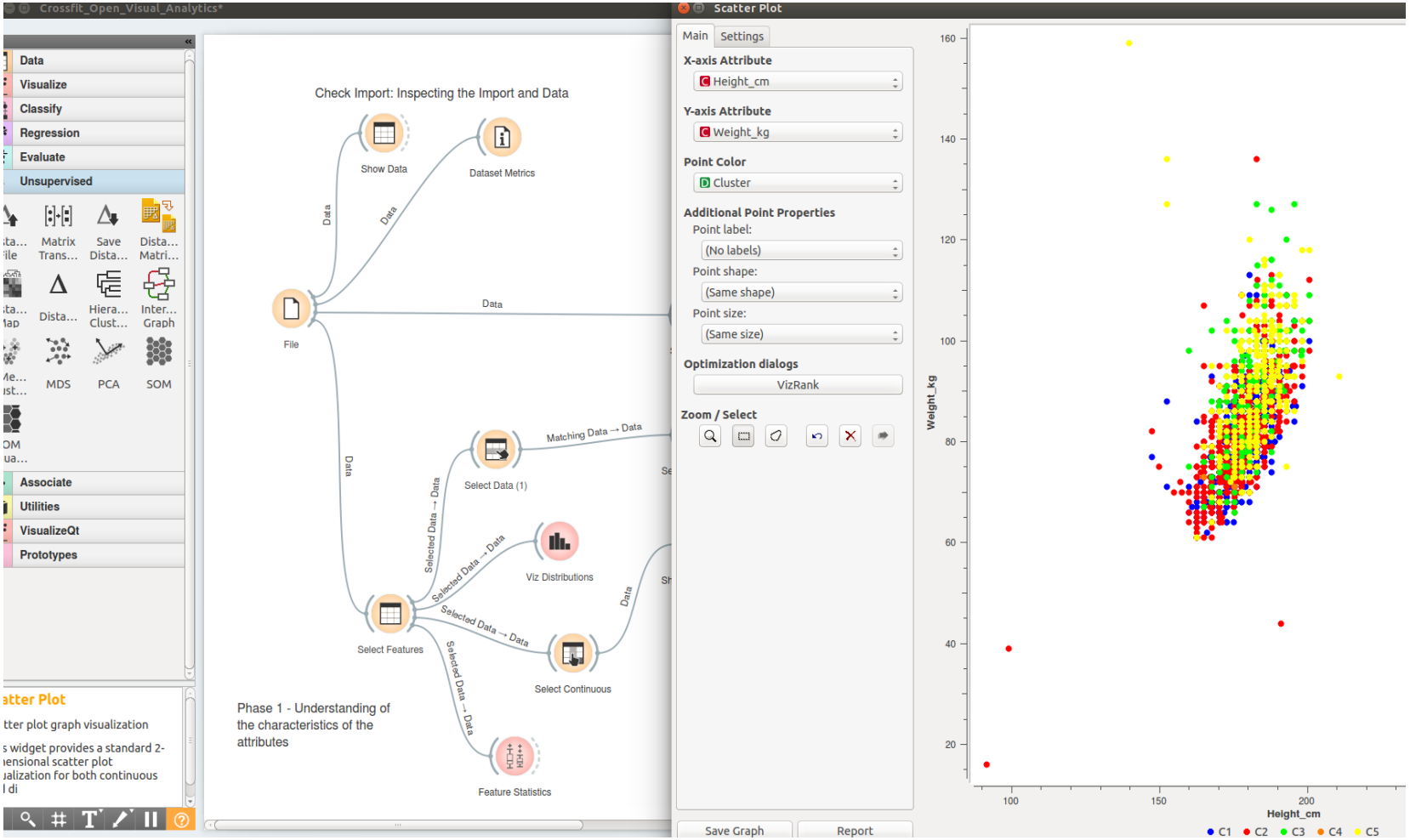
- Software and process work flow



Implementation [30%]. Implementation of the analysis methodology: software used, links between methods (integrated in the same software or data transfer)

Analysis process

- Work to be undertaken and results



Analysis process [10%]. Illustrated description of the analysis process

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Analysis methodology [30%]. Methodology of your analysis.

Results and conclusion

- Current status of the report/analysis

Work is still ongoing...

Report and analysis progress: ***70%***

Results and conclusion [10%]. To what extent the posed task(s) have been fulfilled?